Liquid-crystalline lanthanide complexes: from molecules to materials

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This lecture gives an overview of liquid-crystalline lanthanide complexes and their most striking properties [1]. Special attention will be paid to lanthanide-containing ionic liquid crystals [2]. Metallomesogens that contain rare-earth or lanthanide ions have been much less intensively investigated than metallomesogens that contain d-group transition metals, although the former can possess properties that are less-pronounced for the d-group metallomesogens. Because some of the trivalent lanthanide ions have a large magnetic anisotropy, lanthanide-containing liquid crystals can be aligned by weaker magnetic fields than diamagnetic or even other paramagnetic liquid crystals. Lanthanides often show an intense photoluminescence and in contrast to the fluorescence of organic molecules, the emission bands are very narrow for lanthanide compounds. Therefore liquid-crystalline lanthanide complexes can be used as luminescent liquid crystals [3]. It should be realized that the magnetic and spectroscopic properties of these materials strongly depend on the nature of the lanthanide ion, so that for a given application a proper choice of the lanthanide ion is necessary.

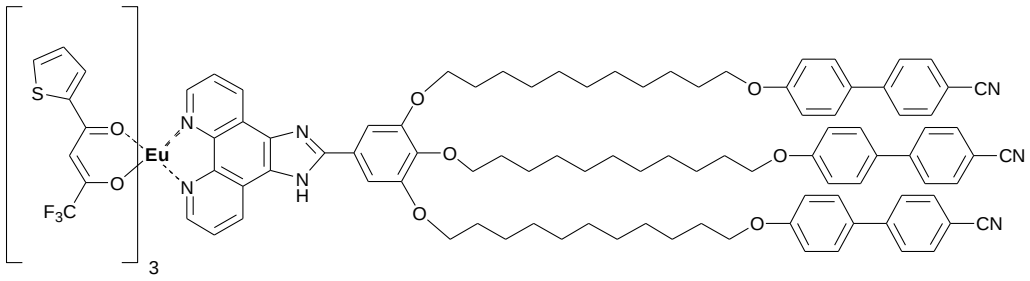

Figure 1: Luminescent europium(III)-containing liquid crystal based on a substituted imidazo[4,5-f]-1,10-phenanthroline ligand.

References

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